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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,151	04/08/2004	Shigeki Kudou	1417-459	6674

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EXAMINER	
NGUYEN, SANG H	

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 08/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/820,151	KUDOU ET AL.	
	Examiner	Art Unit	
	Sang Nguyen	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *08/24/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 08/24/04 has been entered. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

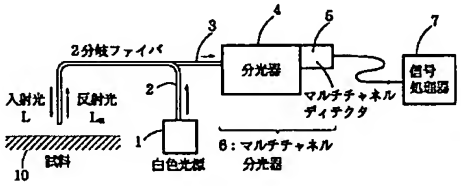
Claims 1-2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kudo et al (JP 07 294 220 submitted by applicant) in view of Ransten et al (JP 11 051 618).

Regarding claim 1; Kudo et al discloses a method for measuring thicknesses of respective layers of a multilayer thin film, comprising:

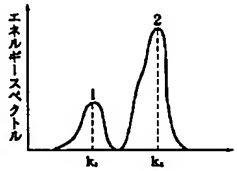
irradiating a white light (L of figure 1 and abstract) from a light source (1 of figure 1) on a sample (10 of figure 1) composed of the multilayer thin film (13, 12, 11 of figure 3 and abstract); and

spectrally dispersing a reflected light (L_R of figures 1, 3, and 5) from the sample (10 of figure 1) , and transforming the resultant energy spectrum from a multi-channel detector (5 of figure 1) into a frequency signal based on wave number units by fast Fourier transformation (abstract). See figures 1-5.

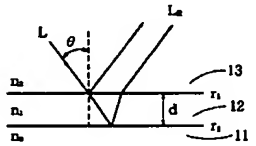
【図1】



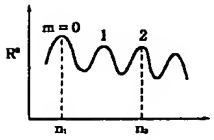
【図2】



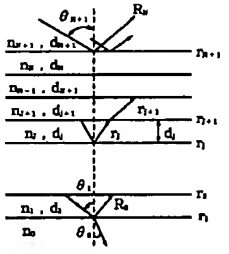
【図3】



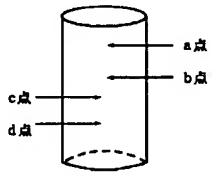
【図4】



【図5】

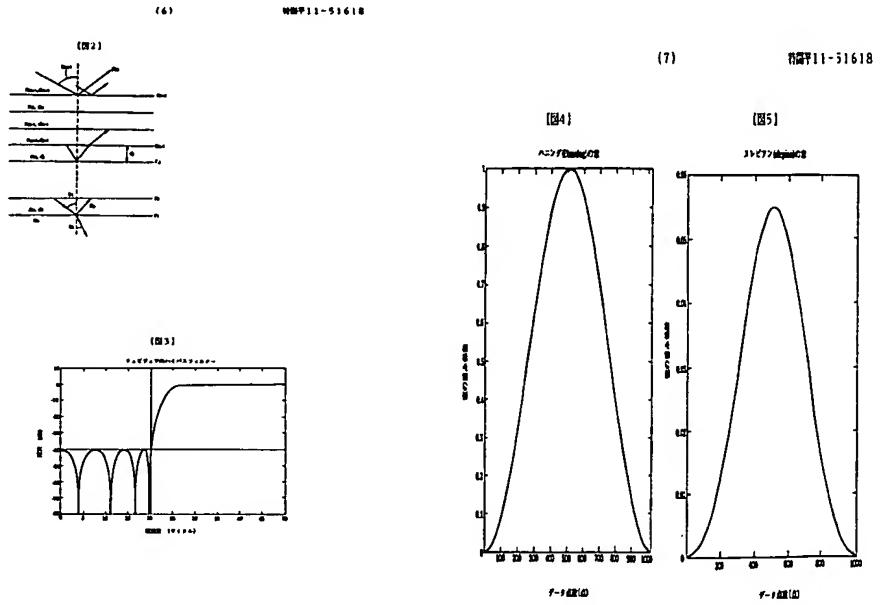


【図6】



Kudo et al discloses all of features of claimed invention except for subjecting the frequency signal to wavelet processing for removing components other than coherence signals from the frequency signal, and then to frequency analysis for detecting the thicknesses of the respective layers of the thin film. However, Ransten et al teaches that it is known in the art to provide a method of measuring thickness of multilayer thin film comprising a processor (7 of figure 1) coupled to a multichannel spectroscope (8 of

figure 1) for subjecting the frequency signal to wavelet processing for removing components (e.g., a DC component [abstract]) other than coherence signals from the frequency signal by a fast Fourier transformation (abstract), and then to frequency analysis for detecting the thicknesses of the respective layers of the thin film by the processor (7 of figure 1 and Abstract). See figures 1-5.



Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the method of Kudo et al with subjecting the frequency signal to wavelet processing for removing components other than coherence signals from the frequency signal, and then to frequency analysis for detecting the thicknesses of the respective layers of the thin film as taught by Ransten et al for the purpose of improving film thickness measuring instrument which can measure a thicker multi-layer film with high precision.

Regarding claim 2; Kudo et al discloses the frequency analysis is a processing conducted by a fast Fourier transform processing (abstract).

Regarding claim 4; Kudo et al discloses all of features of claimed invention except for the white light is irradiated to the sample such that a spot diameter thereof is 0.5 to 1.5 nm. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the method of Kudo et al with a spot diameter of the sample thereof is 0.5 to 1.5 nm, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kudo et al in view of Ransten et al as applied to claims 1 and 4 above, and further in view of Law (U.S. Patent No. 5,754,296).

Regarding claim 6; Kudo et al in view of Ransten et al discloses all of features of claimed invention except for a CCD sensor having plural rows of pixel arrays, the frequency signal being obtained by integrating peaks of the spectrum by the number of the plural rows of pixel arrays. However, Law teaches that it is known in the art to provide a CCD sensor or camera (34 of figure 1) having plural rows of pixel arrays, the frequency signal being obtained by integrating peaks of the spectrum by the number of the plural rows of pixel arrays (col.2 lines 32-42 and col.4 lines 63-67). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the method of Kudo et al with a CCD sensor having plural rows of pixel arrays, the frequency signal being obtained by integrating peaks of the spectrum by the

number of the plural rows of pixel arrays as taught by Law for the purpose of improving measuring thickness sensitivity with high spatial resolution.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kudo et al in view of Ransten et al as applied to claim 1 above, and further in view of Kauppinen (U.S. Patent No. 5,400,265 submitted by applicant).

Regarding claim 3; Kudo et al in view of Ransten et al discloses all of features of claimed invention except for the frequency analysis is a processing conducted by a maximum entropy method. However, Kauppinen teaches that it is known in the art to provide the frequency analysis is a processing conducted by a maximum entropy method (abstract and col.1 lines32-38). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the method of Kudo et al with the frequency analysis is a processing conducted by a maximum entropy method as taught by Kauppinen for the purpose of computing spectral line stabilizing more accuracy.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kudo et al in view of Ransten et al as applied to claims 1 and 4 above, and further in view of Yakabe et al (JP 04 142 407).

Regarding claim 5; Kudo et al in view of Ransten et al discloses all of features of claimed invention except for the light source is irradiated to the sample using a stroboscope. However, Yakabe et al teaches that it is known in the art to provide the light source (2 of figure 1) is irradiated to the sample using a such as stroboscope (abstract). It would have been obvious to one having ordinary skill in the art at the time

the invention was made to combine the method of Kudo et al with the light source is irradiated to the sample using a stroboscope as taught by Yakabe et al for the purpose of performing precise measurement by calculating the thickness of a strip shape object. Also, Kudo et al in view of Ransten et al and further in view of Yakabe et al discloses all of features of claimed invention except for as the sample is exposed to the light for 5 to 15 μsec. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the method of Kudo et al with the sample is exposed to the light for 5 to 15 μsec, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kudo et al in view of Ransten et al and further in view of Yakabe et al as applied to claims 1 and 4-5 above, and further in view of Law (U.S. Patent No. 5,754,296).

Regarding claim 7; Kudo et al in view of Ransten et al and further in view Yakabe et al discloses all of features of claimed invention except for a CCD sensor having plural rows of pixel arrays, the frequency signal being obtained by integrating peaks of the spectrum by the number of the plural rows of pixel arrays. However, Law teaches that it is known in the art to provide a CCD sensor or camera (34 of figure 1) having plural rows of pixel arrays, the frequency signal being obtained by integrating peaks of the spectrum by the number of the plural rows of pixel arrays (col.2 lines 32-42 and col.4 lines 63-67). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the method of Kudo et al with a CCD

sensor having plural rows of pixel arrays, the frequency signal being obtained by integrating peaks of the spectrum by the number of the plural rows of pixel arrays as taught by Law for the purpose of improving measuring thickness sensitivity with high spatial resolution.

Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kudo et al (JP 07 294 220 submitted by applicant) in view of Banet et al (U.S. Patent No. 6,393,915).

Regarding claim 8; Kudo et al discloses an apparatus for measuring thicknesses of respective layers of a multilayer thin film, comprising

a light source (1 of figure 1) emitting a white light (abstract) ; an irradiating optical fiber (2 of figure 1) for irradiating the light (L of figure 1) emitted from the light source (1 of figure 1) onto a sample (10 of figure 1);

a light-receiving optical fiber (3 of figure 1) for collecting a reflected light (L_R of figure 1) obtained from the sample (10 of figure 1);

a monochromator (e.g., spectroscope [4 of figure 1]) for spectrally dispersing the light transmitted from the light-receiving optical fiber (3 of figure 1);

a multi- channel detector (5 of figure 1) for transforming a spectrum obtained by spectrally dispersing the light (L_R of figure 1); and

an arithmetic processing means (e.g., a processor [7 of figure 1]) for transforming the spectrally dispersing the light output (L_R of figure 1) from the multi-channel detector (5 of figure 1) into a frequency signal based on wave number units with fast Fourier

transformation (abstract) and subjecting the frequency signal to an arithmetic processing (7 of figure 1). See figures 1-5.

Kudo et al discloses all of features of claimed invention except for the spectrum obtained by spectrally dispersing the light into an electric signal and an arithmetic processing means for transforming the electric signal output from the multi-channel detector into a frequency signal based on wave number units and subjecting the frequency signal to an arithmetic processing, said arithmetic processing means having a function for subjecting the frequency signal to wavelet processing for removing components other than coherence signals from the frequency signal, and then to frequency analysis for detecting the thicknesses of respective layers of the thin film. Banet et al teaches that it is known in the art to provide method and device for measuring multiple properties of multilayer thin films comprising the spectrum obtained by spectrally dispersing the light 67 of figure 7) from the light source 67 of figure 7) into an electric signal (col.2 lines 30-32) and an arithmetic processing means (e.g. an analyzer [col.2 lines 32-34 and figure 6]) for transforming the electric signal output from the multi-channel detector (70 of figure 7) into a frequency signal based on wave number units (col.2 lines 32-38) and subjecting the frequency signal to an arithmetic processing, said arithmetic processing means having a function for subjecting the frequency signal to wavelet processing for removing components other than coherence signals from the frequency signal, and then to frequency analysis for detecting the thicknesses of respective layers of the thin film (61 of figure 7 and col.7 lines 2-29). See figures 1-10.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the method of Kudo et al with the spectrum obtained by spectrally dispersing the light into an electric signal and an arithmetic processing means for transforming the electric signal output from the multi-channel detector into a frequency signal based on wave number units and subjecting the frequency signal to an arithmetic processing, said arithmetic processing means having a function for subjecting the frequency signal to wavelet processing for removing components other than coherence signals from the frequency signal, and then to frequency analysis for detecting the thicknesses of respective layers of the thin film as taught by Banet et al for the purpose of improving film thickness measuring instrument which can measure a thicker multi-layer film with high precision.

Regarding claim 9; Kudo et al discloses all of features of claimed invention except for the white light is irradiated to the sample such that a spot diameter thereof is 0.5 to 1.5 nm. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the method of Kudo et al with a spot diameter of the sample thereof is 0.5 to 1.5 nm, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kudo et al in view of Banet et al as applied to claim 8 above, and further in view of Law (U.S. Patent No. 5,754,296).

Regarding claim 12; Kudo et al in view of Ransten et al and further in view Yakabe et al discloses all of features of claimed invention except for a CCD sensor having plural rows of pixel arrays, the frequency signal being obtained by integrating peaks of the spectrum by the number of the plural rows of pixel arrays. However, Law teaches that it is known in the art to provide a CCD sensor or camera (34 of figure 1) having plural rows of pixel arrays, the frequency signal being obtained by integrating peaks of the spectrum by the number of the plural rows of pixel arrays (col.2 lines 32-42 and col.4 lines 63-67). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the method of Kudo et al with a CCD sensor having plural rows of pixel arrays, the frequency signal being obtained by integrating peaks of the spectrum by the number of the plural rows of pixel arrays as taught by Law for the purpose of improving measuring thickness sensitivity with high spatial resolution.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kudo et al in view of Banet et al as applied to claim 8 above, and further in view of Yakabe et al (JP 04 142 407).

Regarding claim 10; Kudo et al in view of Ransten et al discloses all of features of claimed invention except for the light source is irradiated to the sample using a stroboscope. However, Yakabe et al teaches that it is known in the art to provide the light source (2 of figure 1) is irradiated to the sample using a such as stroboscope (abstract). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the method of Kudo et al with the light source is

irradiated to the sample using a stroboscope as taught by Yakabe et al for the purpose of performing precise measurement by calculating the thickness of a strip shape object. Also, Kudo et al in view of Ransten et al and further in view of Yakabe et al discloses all of features of claimed invention except for as the sample is exposed to the light for 5 to 15 μsec. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the method of Kudo et al with the sample is exposed to the light for 5 to 15 μsec, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kudo et al in view of Banet et al and further in view of Yakabe et al as applied to claims 8 and 10 above, and further in view of Law (U.S. Patent No. 5,754,296).

Regarding claim 12; Kudo et al in view of Ransten et al and further in view Yakabe et al discloses all of features of claimed invention except for a CCD sensor having plural rows of pixel arrays, the frequency signal being obtained by integrating peaks of the spectrum by the number of the plural rows of pixel arrays. However, Law teaches that it is known in the art to provide a CCD sensor or camera (34 of figure 1) having plural rows of pixel arrays, the frequency signal being obtained by integrating peaks of the spectrum by the number of the plural rows of pixel arrays (col.2 lines 32-42 and col.4 lines 63-67). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the method of Kudo et al with a CCD sensor having plural rows of pixel arrays, the frequency signal being obtained by

integrating peaks of the spectrum by the number of the plural rows of pixel arrays as taught by Law for the purpose of improving measuring thickness sensitivity with high spatial resolution.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Levesque et al (6397680) discloses ultrasonic spectroscopy apparatus and method; Li et al (6392756) discloses method and apparatus for optically determining physical of thin film; Shirai et al (6025596) discloses method for measuring epitaxial film thickness of multilayer; Liu et al (5604581) discloses film thickness; Frijilink (5457727) discloses device for processing a measured signal; Horie (5440141) discloses method of measuring a thickness of a multilayered; Kondo (5120966) discloses method and apparatus for measuring film thickness; or Kondo (4884894) discloses method and apparatus for measuring film thickness.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sang Nguyen whose telephone number is (571) 272-2425. The examiner can normally be reached on 9:30 am to 7:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on (571) 272-2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

July 19, 2006

Sang Nguyen
Patent Examiner
Art Unit 2877